Principles of Software Engineering Spring 2023

CEN 4010

The Weather Wizard App

Group number: 08

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Revision History

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Executive Summary

The Weather Wizard is a comprehensive weather app that provides users with accurate and up-to-date weather information, including current conditions, hourly and daily forecasts, and severe weather alerts. The app offers a user-friendly interface that is easy to navigate and understand, making it accessible to everyone, regardless of their technical expertise.

One of the key advantages of The Weather Wizard is its ability to provide personalized weather information based on the user's location. The app uses advanced algorithms and real-time data to provide users with accurate and hyperlocal weather information, such as temperature, air quality, humidity, wind speed, and precipitation.

Another novel feature of The Weather Wizard is its ability to provide weather information for specific activities, such as running, cycling, hiking, and skiing. The app provides users with real-time weather conditions for their desired activity, along with personalized recommendations on what to wear and how to prepare.

The Weather Wizard values its users' safety and wellbeing and provides severe weather alerts and notifications to keep them informed of any potential hazards. The app also provides detailed information on air quality, UV index, and pollen count to help users make informed decisions about their outdoor activities.

The target market sectors for The Weather Wizard are individuals who are looking for a reliable and comprehensive weather app that provides accurate and hyperlocal weather information. The app is also ideal for outdoor enthusiasts, athletes, and travelers who want to plan their activities based on the weather conditions.

In summary, The Weather Wizard is an innovative weather app that provides users with accurate and hyperlocal weather information, personalized recommendations, and safety alerts. Its user-friendly interface and unique features make it an ideal choice for anyone looking for a reliable and comprehensive weather app.

Competitive Analysis

Feature	Competitor A	Competitor B	Competitor C	The Weather Wizard
Accuracy of weather data	High	High	Moderate	High
User interface	Simple	Complex	Simple	Simple
Personalized recommendations	Limited	Limited	Limited	Comprehensive
Severe weather alerts	Yes	Yes	Yes	Yes
Air quality information	Limited	Yes	No	Yes
Availability	iOS, Android	iOS, Android	iOS, Android	iOS, Android

Analysis:

Competitors A and B offer accurate weather data, but the Weather Wizard aims to offer even higher accuracy. Competitor C offers moderate accuracy, which is a weakness. The Weather Wizard aims to provide personalized recommendations to users, which is a significant advantage over its competitors. Competitors A and B offer severe weather alerts, but The Weather Wizard intends to provide a comprehensive and reliable system. Competitor B offers air quality information, which is a unique feature, but The Weather Wizard intends to offer this information too. All competitors are available on iOS and Android, and The Weather Wizard plans to be available on both platforms too.

Planned Advantages:

The Weather Wizard aims to offer a more accurate and personalized experience than its competitors. It will provide comprehensive recommendations for various activities, such as running, hiking, and skiing, which will help users plan their activities better. The Weather Wizard also intends to provide an advanced system for severe weather alerts, ensuring users stay informed and safe. Additionally, it will offer air quality information to help users make informed decisions about outdoor activities.

The Weather Wizard's user interface will be simple and easy to use, providing users with a hassle-free experience. It will be available on both iOS and Android platforms, making it accessible to a broader range of users. Overall, The Weather Wizard aims to be a reliable and comprehensive weather app that provides personalized recommendations and information to help users make informed decisions.

Data Definitions

General:

Weather - State of atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness; weather is shown day to day in app.

UV Index - Number on a scale that extends indefinitely upward from a baseline of 0 and whose values express intensity of solar ultraviolet radiation at noon on a given day for a particular location with 0 indicating negligible ultraviolet exposure and values over 10 indicating very high ultraviolet exposure.

AQI - Stands for “air quality index”. Tells how clean or polluted the air is around the area. Changes day to day, hour to hour.

Humidity - Moderate degree of wetness - especially of the atmosphere.

Severe Weather Alerts - Updates of weather conditions that need immediate attention, such as winter storms and flash floods.

Precipitation - Something that is being precipitated / condense and fall or deposit, such as a deposit on earth of hail, mist, rain, sleet, snow.

Fahrenheit - Relating or conforming to a thermometric scale on which under standard atmospheric pressure the building of water is at 212 degrees above zero and the freezing point is at 32 degrees above zero and the zero point approx. the temperature produced by mixing equal quantities by weight of snow and common salt. (Denoted by F).

Celsius - Relating to the international thermometric scale on which the interval between the triple point of water and the boiling point of water is divided into 99.99 degrees with 0.01 representing the triple point and 100 the boiling point. (Also known as centigrade, denoted by C).

Weather Features:

Cloud - Visible mass of particles of condensed vapor (e.g. water or ice) suspended in the atmosphere of a planet or moon.

Hail - Precipitation in the form of small balls / lumps usually consisting of concentric layers of clear ice and compact snow.

Mist - Weather in the form of particles floating or falling in the atmosphere at or near the surface of the earth and approaching the form of rain.

Rain - Water falling in drops condensed from vapor in the atmosphere.

Sleet - Rain that freezes or partly freezes as it falls from the sky.

Snow - Precipitation in the form of small white ice crystals formed directly from the water vapor of the air at a temperature of less than 32 F / 0 C.

Weather Sign:

Sunny - Clear day without clouds.

Partly Cloudy - Sky partly covered in clouds.

Cloudy (Overcast) - Sky completely clouded, also known as an overcast in different parts of the world.

Light rain - Weather with about 0.1 mm/h of precipitation.

Rain - Overcast weather with 0.5 to 1 mm/h of precipitation.

Heavy Rain - Overcast weather with about 1 mm of precipitation in an hour or more.

Light Sleet - Weather with a mixture of snow rain - either transitioning from one to another or happening at the same time. Precipitation values are the same for a light rain.

Sleet - Weather with a mixture of snow and rain with precipitation same as rain.

Light Snow - Small ice crystals will fall from the sky. Precipitation of light snow is the same as light rain and light sleet.

Snow - A heavier alternative to light snow and will last for several more hours or more. Same precipitation as rain and sleet.

Heavy snow - A much heavier snowfall that lasts longer than snow - usually up to 24 hours or more. Up to a month’s worth of precipitation can fall in one day and cause more catastrophes.

Partly Cloudy at Night - Night is partly cloudy.

Clear Sky at Night - No clouds sighted at the sky during night time.

Project Overview and User Perspectives:

Our weather app is designed to provide accurate weather information to end-users in real-time. It is a user-friendly mobile application that provides comprehensive weather updates for any location in the world. The app is designed to provide end-users with a simple and intuitive interface that allows them to quickly access the weather information they need.

The Wizard Weather app has a range of features that include current weather conditions, hourly weather forecasts, daily weather forecasts, radar and satellite maps, and severe weather alerts. Additionally, the app has a customizable notification feature that allows end-users to receive alerts for weather events that are important to them. Our app uses advanced weather forecasting technology to provide end-users with accurate and reliable weather information. The app is also designed to be lightweight, which means that it will run smoothly on most mobile devices.

Use Cases:

Checking Current Weather Conditions: One of the primary use cases of a weather app is to check the current weather conditions. Users can open the app to see the temperature, humidity, wind speed, and other relevant information about the weather in their location.

Daily Weather Updates: One of the most common usage scenarios for our weather app is to get daily weather updates. End-users can quickly check the app to get information on the current weather conditions, as well as hourly and daily weather forecasts for their location.

Planning Daily and Outdoor Activities: Our weather app is also useful for end-users who are planning daily and outdoor activities. The app can provide information on the expected weather conditions for the day, allowing users to plan their activities accordingly. For example, users can check the app to see if it is going to rain or be sunny, and plan their day accordingly.

Travel Planning: Another common usage scenario for our weather app is for travel planning. End-users can use the app to get weather updates for their travel destination, allowing them to pack accordingly and plan their activities for the trip.

Weather Alerts: The app also provides severe weather alerts, making it useful for end-users who live in areas that are prone to severe weather events such as hurricanes or tornadoes. The app can provide real-time updates on severe weather events, allowing end-users to take necessary precautions to stay safe.

Agricultural Planning: Our weather app can also be used by farmers or those involved in agriculture to plan their farming activities based on the weather forecast. The app can provide information on the expected rainfall, temperature, and wind patterns, allowing farmers to make informed decisions about when to plant, harvest or water their crops.

Our weather app is a versatile and reliable tool that can be used by a wide range of end-users for different purposes. Its accurate weather forecasting technology and user-friendly interface make it an essential app for anyone who wants to stay updated on the latest weather information.

Story:

There was a young woman named Sarah who lived in a coastal town. Sarah loved spending time outdoors and was an avid runner. She enjoyed running along the coast and taking in the beautiful scenery. One day, Sarah decided to go for a morning run along the coast as she usually did. However, she noticed that the sky looked dark and gloomy, and there was a strong breeze blowing. As she started her run, it began to rain heavily, and she had to cut her run short and rush back home. After that incident, Sarah decided to download a weather app on her phone to stay updated on the weather conditions. She found a popular weather app, The Weather Wizard, with a user-friendly interface that provided real-time updates on the weather in her location. The next time Sarah planned to go for a run, she checked the weather app to see the weather conditions in her area. She noticed that the app provided an hourly forecast and that the rain was expected to stop in a few hours. Sarah decided to wait for a few hours before going for her run, and when the rain stopped, she went for her run and had a great time. Sarah continued to use the weather app regularly, not just for her daily runs but also to plan outdoor activities with her friends and family. She found the app to be extremely useful in providing accurate weather updates and helping her plan her activities accordingly. One day, Sarah received a severe weather alert from the app warning her about an impending storm in her area. Thanks to the alert, she was able to take necessary precautions and stay safe during the storm. In summary, Sarah's story is a great example of how a weather app can be used to stay updated on weather conditions and plan activities accordingly. It also highlights the importance of receiving severe weather alerts, which can help users take necessary precautions and stay safe during natural disasters.

User skill/What users do:

When using the Weather Wizard app, users typically perform the following actions:

Open the App: Users launch the weather app on their mobile device, either by clicking on the app icon or through a voice command.

Check Current Weather Conditions: The app displays the current weather conditions in the user's location, including the temperature, humidity, wind speed, and other relevant information.

View Weather Forecast: Users can view the weather forecast for the next few hours or days, which can help them plan their activities accordingly.

Set Up Notifications: Users can set up notifications to receive alerts about severe weather conditions in their area, such as thunderstorms or hurricanes.

Customize Settings: Users can customize the app's settings, such as units of measurement, language, or preferred display layout, to meet their preferences.

In terms of skill level, weather apps are designed to be user-friendly, with simple and intuitive interfaces that require minimal technical expertise. Users don't need to have any specialized knowledge of meteorology or technology to use a weather app. However, some advanced features, such as setting up custom notifications or accessing historical weather data, may require a bit of technical know-how. Overall, weather apps are designed to be accessible to users of all skill levels, from children to seniors. They provide easy-to-understand weather information that helps users plan their daily activities, travel, and outdoor adventures.

List of high-level functional requirements:

1. Display current weather conditions: The app should get the users location and provide the users current weather conditions such as the temperature, humidity, wind speed and direction, air pressure, precipitation, and visibility.

2. Provide hourly and daily forecast: The app should provide the users with hourly and daily forecast for the current location or any other location the user searches for.

3. Offer customizable settings: The app should allow users to personalize their weather app to provide them information accordingly to their outdoor activities and travel plans for the future. As well as settings to adjust units of measurement, language, or preferred display layout, to meet their preferences.

4. Send weather alerts: The app should send weather alerts when severe weather conditions are present in their area with the appropriate information about the severe weather. Should provide the appropriate actions to take.

5. Provide a user-friendly interface: The app should provide easy-to-understand weather information that helps users plan their daily activities, travel, and outdoor adventures while being easy to use and navigate with all the information provided to them. The app should be visually appealing and customizable.

6. Provide reliable and up to date information: The app should provide reliable up to date weather information with zero error.

List of non-functional requirements

Performance	1. Response time should be less than 2 seconds. 2. Page load time should be less than 3 seconds. 3. Values can be quantified through response time, page load time, and server response time (response time < 2 seconds and page load time < 3 seconds are considered good)
Usability	1. Interface of the app shall be simple, easy to use and visually appealing . 2. User-friendly interface with distinct features and well-organized information. 3. The language of the app should be understandable and should not cause ambiguity. 4. The app should be free of grammar errors. 5. Usability can be measured through testing and gathering subjective feedback on the app's interface.
Availability	1. The app should be available for use 24 hours per day, 365 days per year. 2. The Weather Wizard app should be available for use anywhere in the world.
Storage	1. The app should use a reliable and scalable database to store data and implement data backup and recovery procedures to prevent data loss. 2. The weather app should store weather data and user information securely and efficiently.

Security	1. Users' private information shall be protected. 2. The security of the app should be able to be measured by conducting penetration testing and vulnerability assessments.
Fault tolerance	1. The weather app should be able to recover from failures and continue functioning without data loss or corruption. 2. The Weather Wizard app should have a mechanism for detecting and responding to failures, such as automatic failover or manual intervention.
Localization	1. The Weather Wizard app should adapt to the current location's time zone. 2. The app should display temperature in degrees Fahrenheit or Celsius depending on the users' preferences.

High-level system architecture

1. **User Interface (UI)**: The user interface is the front-end component of the app that interacts with the user. It includes the screens, buttons, and other graphical elements that allow users to view and interact with the weather data. The UI is usually designed to be simple and intuitive so that users can easily access the information they need.
2. **Data Provider:** The data provider is responsible for fetching weather data from various sources such as weather APIs, satellites, weather stations, and other sources. This component collects the raw data and processes it into a structured format that can be used by the app.
3. **Data Processing and Analysis:** Once the weather data is collected, it needs to be processed and analyzed to provide meaningful information to the user. This component uses algorithms and data analytics techniques to derive insights and make predictions about the weather.
4. **Backend:** The backend is responsible for storing and managing user data, such as preferences, location, and other settings. It also manages the communication between the app and the data provider.
5. **Notification System:** The notification system is responsible for sending alerts and notifications to users based on their preferences and location. It receives information from the data processing and analysis component and sends notifications to the user's device.
6. **Third-Party Integrations**: Many weather apps integrate with third-party services such as Google Maps, social media platforms, and other weather-related services. These integrations allow the app to provide a more comprehensive weather experience to the user.

Team:

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Backend:

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Checklist:

A. Team decided on basic means of communication
    a. DONE
B. Team found time slot to meet outside of class
    a. DONE
C. Front and back end team leads chosen
    a. DONE
D. Github master chosen
    a. DONE
E. Team ready and able to use the chosen back and front end frameworks
    a. DONE
F. Skills of each team member defined and known to all
    a. DONE
G. Team lead ensured that all team members read the final M1 and agree/understand it before submission
    a. DONE